

WHO consolidated guidelines on tuberculosis. Module 2: Screening. Systematic screening for active tuberculosis (2020 update)

Background

In 2018 an estimated 3 million of the 10 million people who fell ill with tuberculosis (TB) were not diagnosed or reported to the World Health Organization. The WHO End TB Strategy envisions a 90% reduction in TB incidence and 95% reduction in TB deaths by 2035, and the Resolution adopted by the United Nations General Assembly in September 2018 commits to diagnosing and treating 40 million people with TB by 2022. In order to achieve these ambitious targets, there is an urgent need to deploy strategies to improve TB case detection for people with active TB. One such strategy is systematic screening for TB in high-risk groups and vulnerable populations. The End TB strategy includes systematic screening as a central component of its first pillar to ensure early diagnosis for all TB cases.

To help facilitate the implementation of TB screening at the country level, WHO published guidelines on screening for TB in 2013 – [Systematic screening for TB: Principles and recommendations](#), with accompanying operational guide following in 2015 – [Systematic screening for TB: An operational guide](#). These guidelines included information on the performance of screening tools for TB, estimated yields and number needed to screen (NNS) for screening across different risk groups, and specific recommendations on screening in several high-risk groups and settings.

The revised guidelines will update the recommendations on TB screening, incorporating related guidance from other WHO guideline documents such as the recommendations on contact investigation for TB, screening and preventive therapy for people with HIV, and consolidated guidance for TB preventive treatment, to aid users and member countries in implementing comprehensive screening activities.

The new guidelines will allow policy makers in ministries of health to choose the best approach to planning and implementing TB screening activities, depending on the context. It will also provide a sound basis to countries for the development or the update of national policies for TB screening based on the epidemiology of TB and the health care delivery system in the country.

To advise WHO on the guideline update, a Guideline Development Group (GDG) composed of external experts is being convened to review the evidence and formulate evidence-based recommendations (see list and bios in Annex of this document). The GDG members are involved in the finalization of the guideline questions, the scoring of outcomes, commenting on the evidence to be reviewed, completion of the GRADE tables, formulation of any new or updated recommendations and approval of the final document. The GDG meeting is being held virtually in a series of webinar sessions in June, July and September 2020. Before finalization the guidelines will be reviewed by other experts serving in an External Review Group (ERG).

Key questions

The guidelines update will be framed by the following background and PICO questions.

1. Among people with active TB, does TB screening, compared to standard case detection, identify cases at an earlier stage of disease?
2. Is there a difference in TB treatment outcomes between TB cases who have been found by screening and those who have been found through standard case detection?
3. For people with active TB and their families, does starting treatment after case detection through screening, compared to starting treatment after detection through standard case detection, have a different cost of illness and risk of adverse social consequences?
4. For people being screened for TB who do not have active TB, what are the consequences of TB screening? (new)
5. Does TB screening in addition to standard case detection, compared to standard case detection alone, affect subsequent health seeking behaviour? (new)
6. Does TB screening, compared to standard case detection, initially increase the number of TB cases detected?
7. Does TB screening in addition to standard case detection, compared to standard case detection alone, affect the TB epidemiology in a community?
8. Among people eligible for TB screening, what is the performance of a range of screening tests and algorithms, compared to microbiological reference standards for TB diagnosis?
9. Among people living with HIV, what is the performance of a range of screening strategies, compared to the WHO-recommended four-symptom screen? (new)
10. What is the performance of artificial intelligence (AI) software programs accompanying digital chest radiography (CXR) for screening and triage for TB? (new)
11. Among the general public and high-risk populations, what is the number needed to screen (NNS) in order to detect one case of active TB?
12. Among contacts of people with active TB, what is the number needed to screen (NNS) to find one case of active TB?
13. Among the general public and high-risk populations, with what frequency should screening be conducted? (new)

Key documents

- World Health Organization. The End TB Strategy: Global strategy and targets for tuberculosis prevention, care and control after 2015. Geneva, 2014.
- United Nations General Assembly. Political declaration of the high-level meeting of the General Assembly on the fight against tuberculosis. New York: United Nations, 2018.
- World Health Organization. Systematic screening for active tuberculosis: Principles and recommendations. Geneva, 2013 (WHO/HTM/TB/2013.04).
- World Health Organization. Systematic screening for active tuberculosis: an operational guide. Geneva, 2015 (WHO/HTM/TB/2015.16).
- World Health Organization. Recommendations for investigating contacts of persons with infectious tuberculosis in low- and middle-income countries. Geneva, 2012 (WHO/HTM/TB/2012.9).
- World Health Organization. Intensified tuberculosis case-finding and isoniazid preventive therapy for people living with HIV in resource-constrained settings. Geneva, 2011.
- WHO consolidated guidelines on tuberculosis: Module 1: Prevention - tuberculosis preventive treatment. Geneva, 2020.

Brief biographies of experts invited to serve as GDG members

Muhammad Amir Khan

Institutional affiliation(s): Professional Association for Social Development Pakistan

Academic degrees: MBBS, D.H.A., Ph.D.

City and country of primary residence: Islamabad, Pakistan

Biography: For over two decades, Dr Amir Khan has been working with the TB and other Disease Control Programmes in Pakistan, as a civil society partner, to supplement the development, research and implementation-scaling of contextualized disease control interventions in Pakistan. Some of the developments which he has contributed towards include: integrated care delivery protocols and products for TB, MDR-TB, TB/HIV, malaria, diabetes-hypertension, chronic lung and tobacco cessation, early child development, and hepatitis care interventions at public and/or private facilities. He has contributed to the work and efforts of multiple national and international committees, including: the Global Fund to Fight AIDS, Tuberculosis and Malaria Country-Co-ordinating Mechanism as Vice-Chair; the International Union Against Tuberculosis and Lung Disease (vice president/general secretary/board member), the Research Programme Consortium on Communicable Diseases Health Service Delivery as a member, and working with partner non-governmental organizations to improve the quality of prevention and care services for communicable and non-communicable diseases, as well as making these services easier for people to access, especially in underserved populations. He has also worked as a consultant to government and non-government partners within and outside Pakistan (e.g. Afghanistan, Sudan, Mozambique). He has received international awards such as the Princess Chichibu Memorial TB Award (individual) and Karel Styblo Prize (organization).

Denise Arakaki-Sanchez

Institutional affiliation(s): NTP, State Secretariat of Health, Federal District of Brasilia, Brazil

Academic degrees: MD

City and country of primary residence: Brasilia, Brazil

Biography: Dr Arakaki-Sanchez is a public health doctor from Brazil who has completed additional training in infection control, tropical medicine, health system management, monitoring & evaluation. Since 2016 she has been the general coordinator of the Brazilian TB programme at the Ministry of Health. In the past she has held many different positions related to TB prevention and care, including most recently as a TB consultant for PAHO in Brazil (2011-2015), as a technical advisor for the National TB programme (2009-2011) and national AIDS programme (2002-2005) in Brazil, as an advisor and later Director of Programmes for the International Centre for Aids Care and Treatment Programs (ICAP)/Mailman School of Public Health / Columbia University in Mozambique (2005-2009).

Omolola Mojisola Atalabi

Institutional affiliation(s): College of Medicine, University of Ibadan/University College Hospital (U.C.H)

Academic degrees: MBBS

City and country of primary residence: Ibadan, Nigeria

Biography: Dr Atalabi is a professor of radiology, Head of Department and Paediatric Radiology Unit Department of Radiology in the College of Medicine, University of Ibadan/University College Hospital (U.C.H). She is past president of the World Federation of Pediatric Imaging (WFPI). She is also president of the Association of Radiologists in Nigeria (ARIN) and president of the Society of Pediatric Imaging in Nigeria (SPIN). Dr Atalabi completed her education in Akure, Ondo state and in Edinburgh, Scotland. She has been teaching radiology to medical and dental students. She represents the department of radiology in the examination committee in the final MBBS surgery examinations. As a consultant radiologist in the

University College Hospital, she is involved in training and preparing resident doctors in radiology through teaching, and practical demonstrations for the Fellowship examinations in West African College of Surgeons, and the National postgraduate Medical College.

Helen Ayles

Institutional affiliation(s): London School of Hygiene and Tropical Medicine

Academic degrees: Professor

City and country of primary residence: Lusaka, Zambia

Biography: Dr Ayles is a professor in the Clinical research Unit London School of Hygiene and Tropical Medicine and for the last 14 years have been Director of Research at Zambart, based full time in Lusaka Zambia. She trained as a Physician in London and specialized in infectious and tropical diseases. Has worked as a clinician in UK, Uganda and Zambia and have over 20 years of developing country experience both in clinical TB/HIV management and epidemiology, leading Zambart that has conducted research into the dual TB/HIV epidemic for 20 years in Zambia. Her key research interests are in the fields of TB/HIV and the overlap between them. Has led a number of large cluster-randomised trials of complex public health interventions. Other research grants and interests include: field evaluation of TB diagnostics, adolescent health, association of TB and NCD as well as operational research into the implementation of TB/HIV collaborative activities.

David Branigan

Institutional affiliation(s): Treatment Action Group

Academic degrees: MS

City and country of primary residence: New York, USA

Biography: David Branigan is the TB Project Officer at Treatment Action Group (TAG) in New York, where he leads TAG's TB diagnostics advocacy portfolio, researches the latest developments in TB diagnostics, and engages external partners and affected communities to advocate for equitable access to TB diagnostics. He previously worked as a journalist covering intellectual property and global health policy, and as a researcher in the field of economic and social rights. David holds an MS in International Affairs from The New School, and has more than a decade of experience working in international development.

Gavin John Churchyard

Institutional affiliation (s): Aurum Institute

Academic degrees: Professor

City and country of primary residence: Magaliessig, South Africa

Biography: Dr. Churchyard is a specialist physician with a PhD in infectious disease epidemiology, internationally-renowned for contributions in tuberculosis (TB). He is the founder and Chief Executive Officer of the Aurum Institute NPC, an independent not-for-profit South African public benefit organization that focuses on TB and HIV service delivery, management and research. Dr Churchyard plays a scientific leadership role with respect to TB in the AIDS Clinical Trials Group (ACTG) and HIV Vaccine Trials Network (HVTN). In the ACTG he is the Chair of the ACTG Transformative Science Group (TSG) for TB, a member of the ACTG Scientific Advisory Steering Committee, the Lead Chair of the PHOENIX MDR TB (A5300) protocol evaluating treatment of latent TB infection with multidrug resistant TB using delamanid. Within the HIV Vaccine Trials Network, he is the Chair of the HVTN Network Evaluation Committee, co-Chair of the TB vaccine committee, member of the Scientific Governance Committee, has served on the HVTN Protocol Committee, Concept Working Group and Efficacy trials working group. Dr Churchyard is Principal Investigator of the Aurum Clinical Trials Unit funded through the HVTN. He has initiated and led clinical trials evaluating TB drugs, vaccines and diagnostic and HIV vaccines. He was the

principal investigator of a large cluster randomized trial of community-wide isoniazid preventive therapy among 80,000 South African gold miners, which is the largest trial of isoniazid preventive therapy ever conducted. He plays a leadership role in developing national and international policy and guidelines. He was the Chair of the World Health Organization (WHO) Task Force for the Development of New Policies for the Treatment of TB and a member of the WHO Strategic Technical Advisory Group for TB. He was the past Chair the National TB Think Tank that advises the national department of health on TB policy, implementation and research.

Elizabeth Corbett

Institutional affiliation(s): London School of Hygiene and Tropical Medicine, Faculty of Infectious and Tropical Diseases

Academic degrees: Professor

City and country of primary residence: London, UK

Biography: Liz Corbett is a Wellcome Trust Senior Fellow and a Clinical Epidemiologist with the London School of Hygiene and Tropical Medicine, based full time in Blantyre, Malawi. Her main research interests concern HIV and TB in HIV-prevalent populations from the public health perspective, with a focus on primary care and community level diagnostic interventions. She works closely with the WHO, including prior membership on the Strategic and Technical Advisory Group for the WHO's Global TB Programme. Her research has highlighted the public health importance of undiagnosed infectious TB and community-level interventions providing access to TB and HIV diagnosis. She has ongoing research in self-testing for HIV, management of cough at primary care level, TB diagnostic impact evaluations, and adolescent long-term survivors of mother-to-child transmission of HIV infection.

Anand Date

Institutional affiliation(s): US Centers for Disease Control and Prevention

Academic degrees: MBBS, MD

City and country of primary residence: Atlanta, USA

Biography: Dr. Anand Date is serving as the Associate Branch Chief for the Global TB Branch (GTB) in the Division of Global HIV and TB since 2015. Dr. Date is responsible for setting the strategy and priorities for CDC's global TB portfolio and overseeing the implementation of the same. Prior to his current position, Dr. Date served as the team lead for the TB/HIV team where he was responsible for directing and overseeing CDC's response to HIV-associated TB under the President's Emergency Plan for AIDS Relief (PEPFAR). Anand has been trained in applied epidemiology at CDC's Epidemic Intelligence Program (2004-2006). Before joining CDC in 2004, Anand served as the TB technical consultant for the World Health Organization in India. Anand has completed his medical graduation and Preventive Medicine Residency from Mumbai University in India.

Mao Tan Eang

Institutional affiliation(s): National Centre for Tuberculosis and Leprosy Control (CENAT)

Academic degrees: MD

City and country of primary residence: Phnom Penh, Cambodia

Biography: As Director of National Centre for Tuberculosis and Leprosy Control (CENAT) for the past twenty years, and in collaboration with the National Centre for HIV/AIDS, Dermatology and STI (NCHADS), Dr Mao has created frameworks to implement TB/HIV activities and the Continuum of Care (COC) for people living with HIV/AIDS and TB in Cambodia. He has participated in numerous WHO guideline development and expert meetings in Cambodia and globally. He works to develop NTP policies and

strategic plans, technical guidelines, publications and updated reports for all operational districts and provinces of the country.

Esty Febriani

Institutional affiliation(s): Lembaga Kesehatan Nahdlatul Ulama (LKNU)

Academic degrees:

City and country of primary residence: Jakarta, Indonesia

Biography: Esty Febriani has over 20 years' experience in managing donor-funded health programs. She has experience with a wide variety of formative research, program management, training and advocacy work as well. She has worked on programmes focused on a variety of health issues such family planning, HIV, Maternal and Neonatal health, and she started to focus on TB issues in 2012. She is the head of the programme health division in Lembaga Kesehatan Nahdlatul Ulama (LKNU), an NGO based in Indonesia that focus on community and advocacy, that has a long history of supporting the National TB Programme (NTP). LKNU is the biggest Muslim organization in Indonesia with more than 90 million followers. Currently, LKNU runs TB project as a sub-recipient of Ministry of Health (MoH), covering 61 districts in 10 provinces in Indonesia. LKNU has more than 5,000 community voluntary cadres over the country which actively support NTP to find TB cases and provide social support to improve the treatment adherences. Now, the role of community voluntary cadres has also expanded to support the drug-resistant TB (DR TB) patient. In addition, LKNU also works closely with TB peer support and initiated to recruit and build the capacity of case managers in supporting the treatment adherence of DR TB patient. Beside this, Esty is also one of the advisory board members to Stop TB Partnership Indonesia and active as a lecturer in Public Health Faculty, Health College in West Java.

Anna Marie Celina Garfin

Institutional affiliation(s): National TB Control Program, Department of Health

Academic degrees: MD

City and country of primary residence: Manila, Philippines

Biography: Dr Garfin was designated as National TB Programme point person for the Programmatic Management of Drug Resistant TB and TB HIV Collaboration initiatives in 2013, and NTP Manager in December 2015. She coordinates with different Government Organizations, Non-Government Organizations and other agencies in the promotion of health activities. In her work she: provides technical assistance and advisory services to the DOH-Regional Offices, partner agencies and other stakeholders; coordinates/collaborates with other agencies and stakeholders related to infectious disease prevention and control; supervises the performance of staff hired through the Global Fund Project; is involved in the planning and conduct of monitoring and evaluation of programs/projects related to TB; assists in the planning and conduct of trainings pertaining to TB; monitors the implementation of NTP and NCDVPCP and institutes corrective and remedial measures to ensure the success of the program implementation; is involved in the implementation of the Essential Drug Distribution System piloted in Western Visayas; and assists in the launching of different health program promotion activities. Dr Garfin has long been involved as a trainer and organizer of regional planning and evaluation workshops.

Michel Kaswa

Institutional affiliation(s): National TB Programme

Academic degrees: MD, MPH

City and country of primary residence: Kinshasa, Democratic Republic of the Congo

Biography: Dr Kaswa is currently the director of the National TB Programme in DR Congo, and is technical lead on laboratory, medicines, MDR-TB, TB-HIV, operational research and training units within the NTP.

He is a medical doctor with a Masters degree in public health, focused on control of tropical diseases, from the Institute of Tropical Medicine in Antwerp, Belgium. He has a background in research science and human medical microbiology, with experience in clinical and laboratory sciences including laboratory diagnosis of infectious agents and drugs susceptibility testing. He has also worked as a general practitioner for more than 14 years in low resource settings in DR Congo. He is skilled in clinical and biological management of TB, M/XDR-TB, HIV and co-infected patients. Dr Kaswa has managed research projects from design, data collection and analysis through reporting. He also has experience in clinical laboratory management (personnel, inventory, equipment, maintenance and safety).

Katharina Kranzer

Institutional affiliation(s): London School of Hygiene and Tropical Medicine, Faculty of Infectious and Tropical Diseases

Academic degrees: MD, MSc, MSc, DTM&H, PhD, FRCP, FRCPath

City and country of primary residence: London, UK

Biography: Following her specialist training in Clinical Microbiology and Virology in London, in 2015 Dr Kranzer became the clinical director of the Supranational and National TB Reference Laboratory in Germany. She trained as an epidemiologist at the London School of Hygiene and Tropical Medicine in 2007, followed by a PhD for which her research investigated the role of active case finding and antiretroviral therapy for tuberculosis control in high HIV and TB prevalence settings in South Africa. Her work focuses in sub-Saharan Africa with her research mainly focusing on tuberculosis and HIV, including specifically interventions to improve linkage to care, operational and implementation research and diagnostics. Her current research interests include the improvement of diagnosis and treatment of drug susceptible and resistant tuberculosis, rapid TB diagnostics, multidrug-resistant tuberculosis, HIV-associated tuberculosis and laboratory quality management and capacity building. Her research to date has informed WHO guidelines on systematic screening for active TB and the management of TB infection. She has served on several WHO expert panels and provided expert advice to the European Centre of Disease Prevention and Control and national public health institutions such as the Robert Koch Institute.

Tamara Kredo *Co-chair

Institutional affiliation(s): South African Medical Research Council

Academic degrees: MBChB, MMed (Clin Pharm), PhD

City and country of primary residence: Cape Town, South Africa

Biography: Tamara Kredo is a Senior Specialist Scientist at Cochrane South Africa, based at the South African Medical Research Council. She is a medical doctor with a specialist qualification in Clinical Pharmacology, and PhD in public health. She works in the field of evidence-informed healthcare evidence synthesis and knowledge translation. Her research includes exploring the South African primary care guideline landscape and developing partnerships for enhancing guideline activities in South Africa. Additional fields of interest include enhancing regional clinical trial transparency through the Pan African Clinical Trials Registry and supporting learning initiatives for evidence-informed decision-making in South Africa and the African region through her affiliation with Stellenbosch University and work of the Cochrane African Network.

Knut Lönnroth

Institutional affiliation(s): Karolinska Institutet

Academic degrees: Professor

City and country of primary residence: Stockholm, Sweden

Biography: Prof Lönnroth is a medical doctor with specialization in Social Medicine. He has a PhD in Public Health from Göteborg University and the Nordic School of Public Health. He is a professor of Social Medicine at Karolinska Institutet, Stockholm, Sweden, where he oversees activities related to the assessment of the short- and long-term socioeconomic impact of TB. Previously he worked for the Global TB Programme of the WHO for over 13 years, where he led the development of the initial set of guidelines and recommendations for systematic screening for active TB, released in 2013. He also coordinated the development of a new global TB indicator, and related measurement approaches, for the assessment of the economic impact of TB for patients and households; policy guidance on health systems strengthening; TB elimination in low-incidence countries; management of TB comorbidities; and social interventions to improve TB prevention, treatment uptake and adherence, and financial risk protection. Prof Lönnroth has conducted extensive epidemiological, health systems and social science research on TB during the past 20 years. He is an acknowledged expert on socioeconomic aspects of TB and has published over 100 peer-reviewed articles and many WHO policy documents in this field.

Ivan Manhica

Institutional affiliation(s): National Tuberculosis Control Program

Academic degrees: MD

City and country of primary residence: Maputo, Mozambique

Biography: Dr Ivan Manhica is the Director of the National Tuberculosis Control Program of Mozambique. His work at the Ministry of Health and as project coordinator of TB REACH grants provided by the Stop TB Partnership have contributed to a significant increase in TB notifications in Mozambique. He is the author of more than 15 publications and research works on TB and HIV.

Andrei Mariandyshev

Institutional affiliation(s): Northern State Medical University

Academic degrees: M.D., Ph.D.

City and country of primary residence: Arkhangelsk, Russian Federation

Biography: Professor Andrei Mariandyshev is the head of the Phthisiopulmonary department of the Northern State Medical University and the main TB specialist of the Ministry of Health of the Arkhangelsk region and Northwest federal district (11 regions) of the Russian Federation. He is also a consultant for the TB programme financed by non-governmental organizations in these regions, including the International Federation of Red Cross and Red Crescent Societies (IFRCCS). Under his direction, since 1998 the Arkhangelsk region has experienced a steady decrease in TB incidence and mortality. He has contributed to the training courses for TB experts organized by WHO, and chaired the European Green Light Committee from 2010-2018. Dr Mariandyshev combines treatment activities with teaching and research. He is the author of 62 manuscripts and 22 abstracts published in the international scientific journals and book of conferences. Dr Mariandyshev is also a member of the TB working group of the Barents and Arctic regions, a member of the TB working group of the Ministry of Health of the Russian Federation, and a board member of the Russian Society of Specialists in Phthisiology.

Guy Marks

Institutional affiliation(s): University of New South Wales

Academic degrees: BMedSc MB BS UNSW, PhD Syd, MRCP, FRACP, FAFPHM

City and country of primary residence: Sydney, Australia

Biography: Prof Guy Marks is an Honorary Professor of Medicine, University of New South Wales (Australia). He is a respiratory physician and respiratory and environmental epidemiologist with interests

in TB, chronic airways disease and air pollution. He is Scientia Professor at UNSW Sydney and NHMRC Senior Principal Research Fellow. He is President of the International Union Against Tuberculosis and Lung Disease and, until recently, was co-Editor-in-Chief of the International Journal Against Tuberculosis and Lung Disease. He is a Chief Investigator in the Australian NHMRC-funded Centre for Research Excellence on Tuberculosis. He has a long-standing, close and active collaboration with the National Tuberculosis Program in Vietnam, and with colleagues in that country, has conducted a number of projects, including cluster randomised controlled trials, investigating interventions for better control of TB in high burden settings.

Jeremiah Chakaya Muhwa *Co-chair

Institutional affiliation(s): Respiratory Society of Kenya

Academic degrees: MBChB, M.Med,

City and country of primary residence: Nairobi, Kenya

Biography: Dr Chakaya Muhwa is a respiratory physician based in Nairobi, Kenya. After studying lung medicine at the National Lung and Heart Institute, University of London at the Royal Brompton Hospital and at the Kyorin University Hospital in Tokyo, Japan, Dr Chakaya has worked in the field of global TB care and lung health since 1992, first with the Kenya Medical Research Institute (KEMRI), for which he served as chief research officer, then as the head of the National TB Control Programme in Kenya from 2003-2006, and most recently as the immediate past President of the International Union Against Tuberculosis and Lung Disease. Dr Chakaya has held several additional leadership positions in global TB care, including Chair of the Direct Observed Treatment Short Course (DOTS) Expansion Working Group, Vice Chair of the Stop TB Partnership Coordinating Board and Chair of the Strategic and Technical Advisory Group (STAG) of the World Health Organisation (WHO). Dr Chakaya is a founder member of the Kenya Association for the Prevention of Tuberculosis and Lung Diseases (KAPLTD) and has remained closely engaged with this organisation.

David Mungai

Institutional affiliation(s): Stop TB Partnership

Academic degrees: MBChB

City and country of primary residence: Nairobi, Kenya

Biography: Dr David Mungai is a surgeon and an MDR TB survivor, currently working as a volunteer TB Advocate with Stop TB Partnership in Kenya. His work involves giving health talks to schools, college students and medical students. He advocates for more TB screening and testing among health workers and medical students. He has participated in the WHO public-private mix meeting in Jakarta, Indonesia in 2019, where he gave a talk during the youth town hall meeting. He has also spoken of his experience as both a patient and a clinician in the Union conference on Lung health in Hyderabad, India in 2019. He has also worked as a volunteer at the Nairobi Hospice. He is involved in activities of Operation Smile. He is involved in offering medical services to orphanage homes in Kakamega and Meru. He has participated in medical camps organized by the Independent Medico-Legal Unit (IMLU) in Meru, Thika, Kericho and Kisumu, Kenya.

Nguyen Viet Nhung

Institutional affiliation(s): Vietnam National Tuberculosis Programme

Academic degrees: M.D., Ph.D.

City and country of primary residence: Hanoi, Vietnam

Biography: Associate professor Nguyen Viet Nhung is currently Director of the National Lung Hospital, Manager of the National Tuberculosis Control Program, President of the Vietnam Association against TB and Lung Diseases and Head of TB and Lung Diseases Faculty of Ha Noi Medical University, Viet Nam. Dr. Nhung is an active member of ATS, ESMO, IASLC and IUATLD. He obtained his medical degree from Hanoi Medical University and did his 3-year residency specialized in TB and lung diseases at the National Lung Hospital in Hanoi and completed his PhD scholarship in the Charles University in Prague, Czech Republic in 2000 with thesis on “the role of immunohistochemistry in typing and prognosis of lung cancer”. He was appointed as Associate Professor of the Ha Noi Medical University in 2012 and he is also a guest lecturer in Army Medical University, Hanoi School of Public Health. He has been a member of the regional Green Light Committee (rGLC) for the Western Pacific region from 2011-2015 and a current member of WHO Task Force on development of policies for the rational introduction of new TB drugs and a member of the WHO STAG TB from 2016. Prof Nhung’s research interests are primarily in the areas of lung cancer, TB, asthma and COPD. Since 2010, he is deputy editor in chief of National Journal of TB and Lung Diseases. His research interests are primarily in the areas of TB, lung cancer, asthma and COPD and he has published 137 scientific articles, 45 scientific abstracts and 41 books.

Iveta Ozere

Institutional affiliation(s): Children's Clinical University Hospital

Academic degrees: M.D., Ph.D.,

City and country of primary residence: Riga, Latvia

Biography: Dr Iveta Ozere is a graduate from Riga Medical Institute. Pediatrician and pneumonologist having 36 years working experience in clinical practise. University lecturer with 25 years teaching experience. Temporary adviser of WHO in the field of pediatric tuberculosis. Works as a medical doctor pneumonologist at Children's Clinical University Hospital, Ward of Pneumology, Allergy, and Dermatology. Present medical doctor pneumonologist at Riga Eastern Clinical University Hospital "Centre of Tuberculosis and Lung Diseases", head of the Tuberculosis Treatment Ward. Temporary adviser of World Health Organization in the field of childhood tuberculosis (Conducting courses on the management of childhood tuberculosis in Kyrgyzstan, Kazakhstan, Armenia, Belarus, Latvia. Consulting and reviewing of recommendations on the management of childhood tuberculosis in Belarus and Kyrgyzstan). Present Associate Professor at Rīga Stradiņš University, Faculty of Medicine, Department of Infectology. Present lecturer of World Health Organization Collaborating Centre for Research and Training in the Management of Multidrug-resistant Tuberculosis at the "Centre of Tuberculosis and Lung Diseases" of the Riga Eastern Clinical University Hospital.

Alena Skrahina

Institutional affiliation(s): The Republican Scientific and Practical Center for Pulmonology and TB

Academic degrees: M.D., Ph.D., D.M.Sc.

City and country of primary residence: Minsk, Belarus

Biography: Dr Alena Skrahina is a medical doctor who graduated from the Minsk Medical University (Belarus) in 1986, and received her Doctor of Medical Science degree in 2010. Since 1986 she has been working in the field of respiratory medicine and TB in the Republican Scientific and Practical Centre for Pulmonology and TB (RRPCPTB) for Belarus. As a Deputy Director of the RRPCPTB and Deputy National TB Program Manager since 2005, Alena Skrahina has been responsible for organizing and conducting clinical management of TB, M/XDR-TB, and HIV/TB patients; chairing the National M/XDR-TB Expert’s Board (Consilium); and managing the National TB Program, major recent achievements of which include implementation of new and repurposed TB drugs containing regimens, implementation and roll out of new rapid diagnostics and video supported treatment for TB patients. Dr Skrahina has been actively

involved in international efforts on TB control as a Head of Regional Green Light Committee for Europe, a member of MDR-TB ERS/WHO Consilium, Guideline Development Group on WHO Consolidated DR-TB Treatment Guidelines, WHO ELI Core Group, European Technical Advisory Group on Tuberculosis Control (TAG-TB), Strategic and Technical Advisory Group on Tuberculosis (STAG TB), WHO Childhood TB Group, WHO Wolfheze Working Group on Social Determinants of Tuberculosis, WHO Wolfheze Working Group on TB/HIV Collaborative Activities and WHO Wolfheze Working Group on new TB Drug Introduction and Anti-TB Drug safety. She is a former member of the Global Laboratory Initiative and WHO Task Force for New Drug Policy Development.

Marieke Van der Werf

Institutional affiliation(s): European Centre for Disease Prevention and Control

Academic degrees: MD, PhD, MSc, MPH

City and country of primary residence: Stockholm, Sweden

Biography: Marieke J. van der Werf is the head of the Disease Programme Tuberculosis and the acting head of the Disease Programme on Vaccine Preventable Diseases at the European Centre for Disease Prevention and Control in Stockholm, Sweden. She is responsible for the scientific and technical work of the Centre on surveillance, diagnosis, guidance development, and country support for tuberculosis and vaccine preventable diseases. She is trained as a medical doctor, in biomedical sciences, and in public health, and is a registered epidemiologist. She earned her PhD in 2003 and has published 140 articles in international peer-reviewed journals. She has worked in Europe, Africa, and Asia, and has provided technical assistance and built capacity for epidemiological and operational research on topics relevant for tuberculosis prevention and care. She has participated in many international policy and guidelines development groups, such as the World Health Organization STAG-TB and the Task Force Impact Measurement.

In order to enhance its management of conflicts of interest as well as strengthen public trust and transparency in connection with WHO meetings and activities involving the provision of technical/normative advice, the names and brief biographies of individuals ("Published Information") being considered for participation in a WHO-convened Guideline Development Group are disclosed for public notice and comment. The Published Information is provided by the experts themselves and is the sole responsibility of the individuals concerned. WHO is not responsible for the accuracy, veracity and completeness of the Published Information provided. Furthermore, in no event will WHO be responsible or liable for damages in relation to the use of, and reliance upon, the Published Information. The comments received by WHO through the public notice and comment process are treated confidentially and their receipt will be acknowledged through a generic email notification to the sender. Comments brought to the attention of WHO through this process are an integral component of WHO's conflict of interest assessment process and are carefully reviewed. WHO reserves the right to discuss information received through this process with the relevant expert and disclose to this expert the name and affiliation of the provider of such information. Upon review and assessment of the information received through this process, WHO, in its sole discretion, may take appropriate management action in accordance with its policies. Guideline Development Groups (GDG) provide technical and/or normative advice and recommendations to WHO. Participation in a GDG convened by WHO does not necessarily mean that the views expressed by the expert concerned are shared by WHO and/or represent the decisions or stated policy of WHO. In view of the relatively limited extent of this revision the GDG members for this update are mostly the same ones that participated in the GDG that produced the consolidated LTBI guidelines in 2018. The list of participating experts, a summary of relevant interests disclosed by such experts, and any appropriate mitigation measures taken by WHO relating to the management of conflicts of interests, will be reported publicly in accordance with WHO policies.

For any questions please email gtbprogramme@who.int